



## Developing Next to Water Supplies in NH: Approaches and Opportunities for Protection

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### Overview

- DES approach to water supply protection.
- Local opportunities for protecting water supply

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### Water Supply Challenges

- Rapid conversion of natural landscapes to new residential, commercial, industrial uses
  - Changes to hydrologic cycle, release of pollutants
- Lack of resources and technical information to formulate protections and address threats
  - How do we find the time, money and information necessary to protect existing and future water supplies?

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## Several common contaminants being studied...

- MTBE** → Plumes can extend 1,500 ft; 41% detection rate of MTBE in PWSs in Rockingham County (USGS/DES 2004)  
 Phasing out in '06
- Salt** → NH DOT has spent \$2.8 million since 1993 to replace 397 water supply wells contaminated with NaCl

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## DES Water Supply Approach

### DES has...

1. Defined the resource areas to protect;
2. Inventoried and Assessed threats;
3. Requires setbacks from water supply;
4. Enforces BMPs.

### Towns/Water Suppliers can

- Refine the “resource area”
- Update threat inventory; improve assessments of threats
- Require greater or different setbacks;
- Local oversight, better management of PCSs.

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## DES Protection Approach

### Land use controls

- ☐ Setbacks, land use controls in watersheds (Env-Ws 386)
- ☐ Define *Wellhead Protection Areas* (Env 378,379)
- ☐ Define *Sanitary Radius* (... “natural state” of surrounding area)

### Monitoring / Inspection

- ☐ Inspections of PCSs in WHPAs (small community systems)
- ☐ Chem. monitoring to meet state/federal DW standard

### BMPs

- ☐ Suggest or enforce BMPs for regulated substances (Env-421)
- ☐ Administer state Groundwater Reclassification (Env-420)

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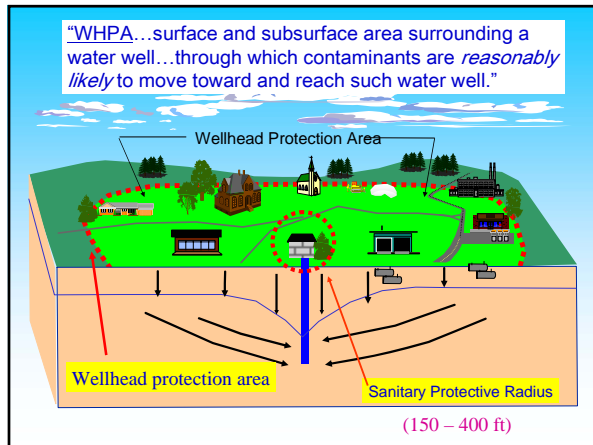
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### Proximity & Setbacks: DES Setbacks from Water Supply (in State Rules)

WATER SUPPLY	LAND ACTIVITY	Min. Setback
Private wells	Septic systems Env-Ws 1000	75 ft
All PWSs	Gasoline USTs (Env-Wm 1401.28)	500 ft <sup>new</sup>
All PWSs	Buried Stumps/asphalt (Env-Wm 810.09)	75 ft
All PWSs	Biosolids Appl.(Env-Ws 1607.09)	300-500 ft
Private/ Community Well	Pesticide Mixing	75-400 ft.
Community Well	Surface water (Env-Ws 378,379)	50 ft.

PWSs = large & small community wells, surface water supplies.



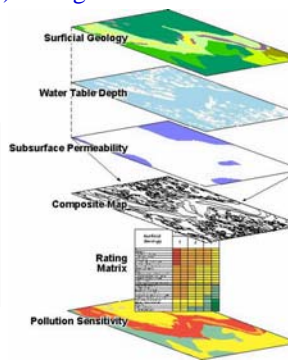
### Opportunity 1: Access Data and Studies to Refine the Resource area(s) to target efforts

Where's the resource?

In proximity to threats?



DES/ NH Geologic Survey



Use existing local hydrologic studies in local land use controls (make or refine zone boundary)

- ☐ 5 day pump test
- ☐ Projected 180 days of continuous pumping with no recharge

- Permitted uses
- PCS management
- Stormwater treatment



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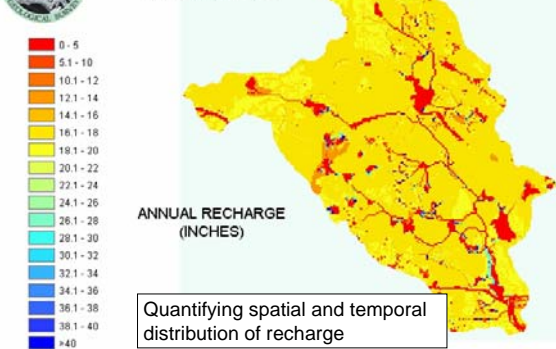
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...or can plan/zone protection on models (recharge)

## RESULTS



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## #2 Opportunity Inventory Threats and formulate a Local "Threat" Assessment

How vulnerable are your water supplies and to what?

- Leaks from UST, ASTs or gas station dispensers?
- Stormwater from new development?
- Salt application near wells?
- Runoff from urban land uses?

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## Identify Threats....consider solutions

**Numbered state highways or active railroads in WHPA or HAC.**

- Emergency response planning
- Better salt application
- Water quality monitoring
- Land acquisition

**Septic systems (or sewer lines) located within WHPA**

- Water quality monitoring
- Septic pumping program;
- Soil-based lot sizing, require maintenance of septic systems

**Urban land cover in WHPA or HAC.**

- Limit future density / impervious surface;
- Stricter post-construction stormwater management
- water quality monitoring

<http://www.des.nh.gov/factsheets/ws/ws-12-8.htm>

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## DES Assessment... Prioritizes Threats...

Source Type	Data Assessment Completed	Vulnerability Rankings	High	Medium	Low	Detests	Wetlands	KCSs	PCSA	Highways/RRA	Pesticides	Septics	Urban Land Cover	Ag Land Cover	Animals	Lagoons	Sewer lines	Dry discharges	Trophic status
-Transient, Non-Community; N=Transient																			
MILFORD DEPT OF PUBLIC WORKS																			
G	1/31/2001	4	3	5	L	L	M	M	M	L	H	H	H	L	H	L	H	L	L
G	1/31/2001	4	3	5	L	L	M	M	M	L	H	H	H	L	H	L	H	L	L
NE	12/3/2001	0	0	0															

...useful for evaluating site specific threats, vulnerabilities or to implement protections

H = High threat  
M = Medium threat  
L = Low threat

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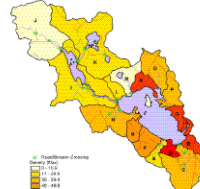
## #3. Formulate Protection Plans

### Waukegan Watershed Source Protection Plan

This process yielded ten primary concerns, in order of priority.

1. Septic Systems
2. Site Development
3. Motor-boating
4. Stormwater
5. Roads
6. Residential Heating Fuel Storage
7. Lawn Care
8. Discarded Railroad Ties
9. Meredith Sewer System
10. Body Contact in a Surface Water Supply

Figure 3.1 Map of road density by subwatershed and road stream crossings in the Waukegan Watershed. (Map prepared by R. McGinnis, Town of Mendon).



Management Plan for the Waukegan Watershed

Road density

Plan is at [http://www.des.nh.gov/DWSPP/nh\\_source.htm](http://www.des.nh.gov/DWSPP/nh_source.htm)

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## Planning the future



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## Good site design controls can offset poor management



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## Poor Site Controls



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## Proper Site Controls



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## Three Local Review Points

### 1. Pre-development (pre-application)

- Review in relation to local plans -- general scale of development, distance to drinking water resource areas, area soils, slopes, water table, surficial geology, confining layers in hydrology, fractures.

### 2. Site Plan / Subdivision Review Process (PB,CC)

- Review infrastructure, lot size/density, open space, setbacks, built features (envelope, parking, etc.) in relation to resource areas

### 3. Post Development/Redevelopment

Ensure long term management; environmentally sensitive redev.

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## Opportunity 4: Address water supply protection pre-development phase

- **Pathways** (contaminants to water source)
- **List of potential contaminants:** (MSDS sheets)
- **Proximity and setbacks:** Resource is up-gradient or down-gradient from the land use?

Avoid re-designing the site.

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## How will the Site Plan address...

- Outdoor storage?  
– Secondary Containment
- Stormwater?  
– Co-mingling with regulated substances
- Emergency response?  
– Spill preparedness
- Transfers/loading?
- Waste management areas?




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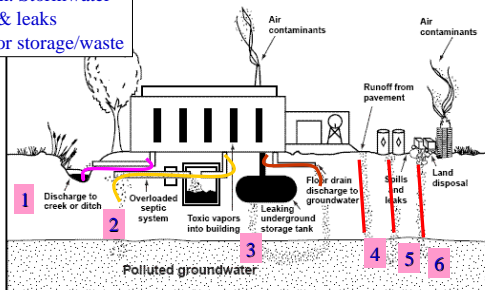
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## Possible Pathways for Contaminant

1. Drain pipes
2. Septic failures
3. UST leaks
4. Contam. Stormwater
5. Spills & leaks
6. Outdoor storage/waste

**Contamination Pathways**  
(Source: Waste Systems Institute of MI)




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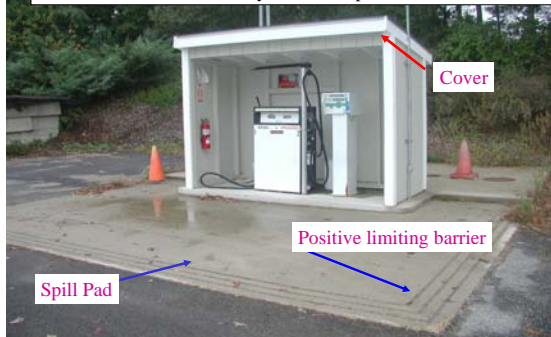
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## Env-421.05(b) Fuel Transfers

Fueling or transferring regulated substances from or to containers shall be done only over an impervious surface.




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**Env-421.04(b)** Storage upon impervious surfaces  
for regulated substances

Regulated containers... shall be stored in an area  
having an impervious surface.



Env-421 Online at [www.des.nh.gov/dwspp/reclass](http://www.des.nh.gov/dwspp/reclass)

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**Opportunity 5. Improve stormwater  
management plans**

- Minimize stormwater generation
- Reduce or redirect contaminated stormwater
- Address “treat ability” of pollution

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**Non-residential stormwater Plans:**

- Identify areas to avoid infiltration (past spills);
- Show drainage areas for exposed materials, waste areas
- Show potential spill and leak areas (mixing pads)
- Show measures to reduce “run-on” particularly through contaminated surfaces.

...Then select the most effective treatment for expected  
pollutant

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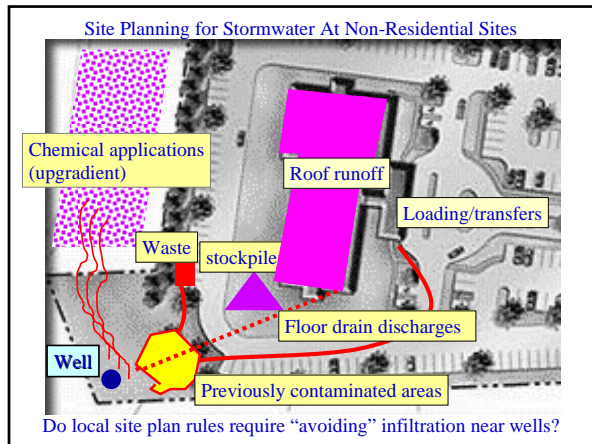
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Employ Low Impact Development Concepts to Reduce Stormwater Generation

LID seeks to:

- Maximize roughness
- Minimize impervious surfaces
- Minimize Slopes
- Maximize retention
- Filter Runoff

Bad

Good

[http://www.cwp.org/Community\\_Watersheds/Paxton/bettersitedesign.pdf](http://www.cwp.org/Community_Watersheds/Paxton/bettersitedesign.pdf)

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Low Impact involves...

- Disconnecting (reduce)
- Directing development away from sensitive resource areas.
- Filtration and treatment through bioretention

See <http://www.lowimpactdevelopment.org>

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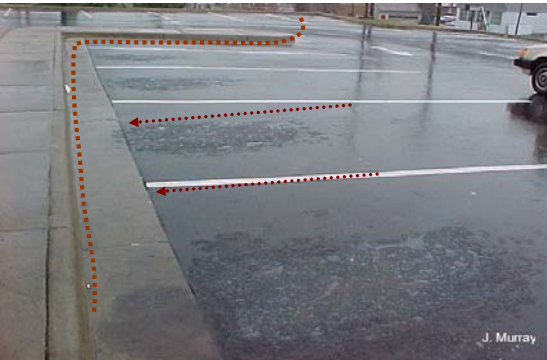
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## LID: Disconnect and Treat




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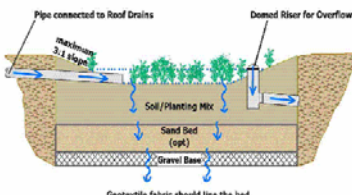
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## Bioretention: Treat

Structural BMP Criteria

### BMP #: Recharge Garden/Rain Garden/Bioretention Garden



A Recharge Garden (also called a Rain Garden or a Bioretention Garden) is an excavated shallow surface depression planted with specially selected native vegetation to treat and capture runoff and typically underlain by a sand or gravel infiltration bed.

✓ Pathogens	✓ Nutrients
✓ Total Suspended Solids	✓ Metals

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## Treat: What is the Pollutant Removal Efficiency?



Bioretention column

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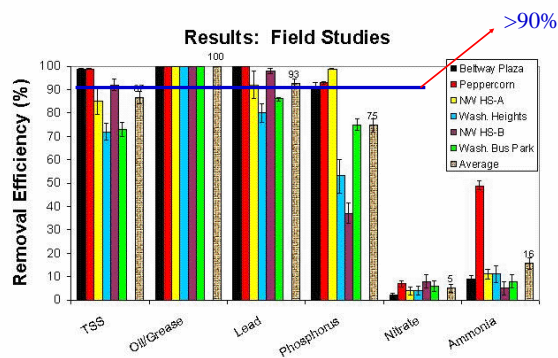
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## Bioretention Pollution Removal Efficiency



University of Maryland, 2004

## ...more bio-retention removal efficiencies

System	Total Suspended Solids (TSS)	Total Phosphorus (P)	Total Nitrogen (N)	Zinc	Lead
Bioretention	-	81	43	99	99
Dry Well	80-100	40-60	40-60	80-100	80-100
Infiltration Trench	80-100	40-60	40-60	80-100	80-100
Filter/Buffer Strip	20-100	0-60	0-60	20-200	20-200
Vegetated Swale	30-65	10-25	0-15	20-50	20-50
Infiltration Swale	90	65	50	80-90	80-90
Wet Swale	80	20	40	40-70	40-70
Rain Barrel	NA	NA	NA	NA	NA
Cistern	NA	NA	NA	NA	NA

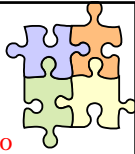
Source: Prince George's County Bioretention Manual, 2001. Source: <http://www.huduser.org/>

## Opportunity #6: Fill Gaps in Protections

For example...

- **GAP:** protect WHPAs for community well(s) that have been grandfathered (pre-1992);
  - Greater setbacks, PCS management, reduce pathways
- **GAP:** protect non-community well (not subject to community well siting rules)
  - Require a natural state setback (Hotels, restaurants, campgrounds, etc. (1,100 systems)
- **GAP:** Properly review accessory or secondary uses that use regulated substances
  - (small engine repair, hobby farms) or have exemptions. (i.e. agriculture)

## Continue “Filling Gaps”...



- **GAP:** Up-gradient PCS draining into wells/surface supplies
  - Limit or more closely review discharge/recharge if up gradient
- **GAP:** Expansion or redevelopment in historic or urban areas
  - Restrict infiltration toward and through polluted sites, auto salvage yards, known brownfields

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## Opportunity #7: Enforcement

- Broad authority to enact and enforce innovative land use controls (RSA 674 / 676),
- RSA 485C, Groundwater Protection Act) or for public health (RSA 147).
- Joint Inspection & Enforcement with DES

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## Summary of Opportunities

1. Refine the GW Resource protection area(s);
2. Inventory and Assess Threats;
3. Develop protective plans -- address “Gaps”;
4. Address water supply protection in pre-development phase
5. Improve stormwater management;
6. Fill Protection Gaps (as per plans)
7. Enforcement;

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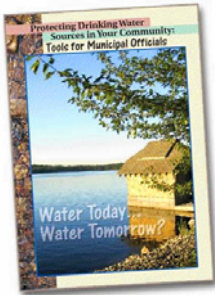
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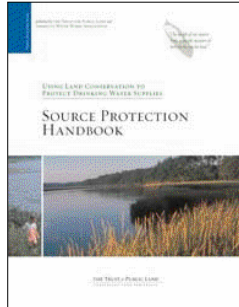
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## Source Protection Guides



<http://www.neiwpcc.org/>



<http://www.tpl.org/>

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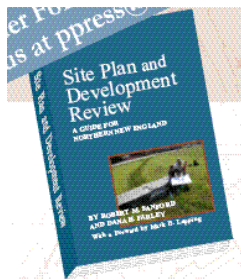
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## Site Plan Review (protecting water quality)



<http://www.enviro-source.com/vt/FlyerforWeb.pdf>

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## Related Internet Sites

### Low Impact Development

- <http://www.epa.gov/owow/nps/lid/>
- <http://www.lowimpactdevelopment.org>

### Source Control Plans

- <http://www.des.nh.gov/DWSPP/>
- <http://www.gsrwa.com/programs.htm>

### Bioretention:

- <http://www.ence.umd.edu/~apdavis/Bio-research.htm> (Univ. of Maryland)

### Salt:

- <http://tac-atc.ca/english/pdf/drainage.pdf> (Transp. Assoc. of Canada)

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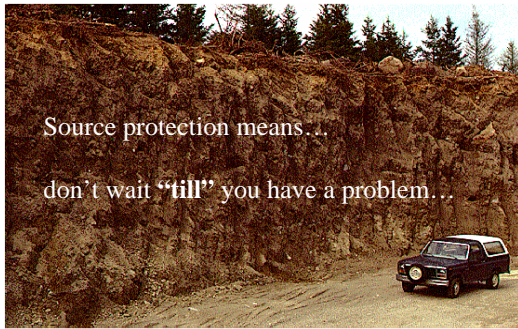
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End



Rock debris that was released directly from melting glacial ice is called till.  
This thick deposit is located near Springfield.

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